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10/828,357	04/19/2004	Bill J. Peck	10031095-1	4887

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EXAMINER	
FORMAN, BETTY J	
ART UNIT	PAPER NUMBER
1634	

NOTIFICATION DATE	DELIVERY MODE
07/08/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

IPOPS.LEGAL@agilent.com

Office Action Summary	Application No.	Applicant(s)	
	10/828,357	PECK ET AL.	
	Examiner	Art Unit	
	BJ Forman	1634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 March 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,8-19 and 21-33* is/are pending in the application.

4a) Of the above claim(s) *25-33* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,8-19 and 21-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 19 March 2008 has been entered.

Status of the Claims

2. This action is in response to papers filed 19 March 2008 in which claims 1, 11, 24 were amended and claims 5-7, 20 were canceled. The amendments have been thoroughly reviewed and entered.

The previous rejections in the Office Action dated 20 December 2007, not reiterated below, are withdrawn in view of the amendments. Applicant's arguments have been thoroughly reviewed and are discussed below as they apply to the instant grounds for rejection. New grounds for rejection are discussed.

Claims 1-4, 8-19, 21-24 are under prosecution.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-4, 8-19, 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Webb et al (GB 2344716, published 2 April 2001) in view of Blanchard (U.S. Patent No. 6,419,883, issued 16 July 2002).

Regarding Claims 1, 11, 24, Webb et al disclose a method of fabricating a chemical array of biopolymeric ligands, said method comprising: (a) determining a chemical array layout in which each feature in said chemical array layout has a size that is chosen based on its biopolymeric ligand composition; and(b) fabricating said chemical array of biopolymeric ligands according to said chemical array layout wherein said fabricating is accomplished with a fluid drop deposition device, wherein said fluid drop deposition device comprises at least one deposition head and said fabricating comprises modulating the applied activation signal for each ejector of said at least one deposition head to produce said features, wherein said deposition head is under the control of a processor and said method comprises transmitting said feature sizes to said processor, whereby said processor performs said modulating based on said feature sizes to correct feature size (Fig. 16-19, pages 30-35), and wherein at least one of the fluids dispensed from said fluid drop deposition device is a monomer for in situ synthesis of a polymer array (page 8, first paragraph).

Webb specifically teaches the method is used for in situ synthesis, but is silent regarding the monomer solution. However, in situ synthesis via fluid deposition of

phosphoramidite was well known and routinely practiced in the art at the time the claimed invention was made as taught by Blanchard who teaches the most preferred monomer for in situ synthesis is a phosphoramidite (Column 14, lines 42-45). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to apply the phosphoramidite of Blanchard to the in situ synthesis of Webb. One of ordinary skill in the art would have been motivated to do so with a reasonable expectation of success and for the benefit of using the most preferred components for in situ synthesis as taught by Blanchard (Column 14, lines 42-45).

Regarding Claim 2, Webb teaches the method wherein the spots have different size (Fig. 16-19). And Blanchard teaches the method wherein the spots have different size (Column 9, lines 44-45).

Regarding Claim 3, Webb teaches the method wherein the feature are of the same composition i.e. at least some of the fluid droplets will contain different polynucleotides. Hence, some of the droplets will have the same (page 4, lines 15-16). And Blanchard teaches the method wherein the features are "of the same composition" e.g. nucleotides making up the oligonucleotide probes (Columns 13-14).

Regarding Claim 4, Webb teaches the method wherein the feature are of different composition i.e. at least some of the fluid droplets will contain different polynucleotides (page 4, lines 15-16). And Blanchard teaches the method wherein the features are of different composition e.g. differing arrangement of nucleotides making up the oligonucleotide probes (Columns 13-14).

Regarding Claim 8, Webb teaches the method wherein the ejector is a piezoelectric pump (page 15, lines 10-12). And Blanchard teaches the method wherein the ejector is a piezoelectric pump (Column 5, lines 1-2).

Regarding Claim 9, Webb teaches the method produces a nucleic acid array (Abstract). And Blanchard teaches the method produces a nucleic acid array (Column 6, lines 6-30).

Regarding Claim 10, Webb teaches the method produces a peptide array (page 8, last paragraph). And Blanchard teaches the method produces a peptide array (Column 6, lines 6-30).

Regarding Claim 12, Webb teaches the method providing a modulated waveform based on desired (i.e. corrected) feature size (page 30-35).

Regarding Claim 13-19, Webb teaches the method wherein modulated waveforms are provided to each orifice based on target drive pattern when compared to actual drive pattern. From this comparison, the waveform to each orifice is modulated based on programmed instructions to produce desired spot size (page 30-35 and Fig. 16-19).

Regarding Claim 21, Blanchard teaches the method deposits droplets of phosphoramidites and activator (Column 13, line 40-Column 14, lines 67) wherein the dispenser provides the defined reagents accurately for simple and direct synthesis (Column 10, lines 28-45).

Regarding Claim 22, Webb teaches the method produces a nucleic acid array (Abstract). And Blanchard teaches the method produces a nucleic acid array (Column 6, lines 6-30).

Regarding Claim 23, Webb teaches the method produces a peptide array (page 8, last paragraph). And Blanchard teaches the method produces a peptide array (Column 6, lines 6-30).

5. Claims 1-4, 8-19, 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Blanchard (U.S. Patent No. 6,419,883, issued 16 July 2002) and Hirota et al (U.S. Patent No. 6,753,144, filed 21 June 2001).

Regarding Claims 1, 11, 24, Blanchard teaches a method similar to that of Hirota comprising determining a chemical layout based on composition to be produced i.e."the name of an oligo specification files storing the geometry of the desired patterns to be deposited in a particular wafer" (Column 34, lines 1-4). Blanchard further teaches fabricating the array using a fluid drop deposition device comprising at least one head wherein the deposition is under control of the processor (§ 5.5.2) and wherein at least one fluid comprises a phosphoramidite (Column 13, line 40-Column 14, lines 67). Blanchard further teaches the resulting features have differing sizes (Column 9, lines 44-45). The teaching of Blanchard differs from the claimed invention in that the

reference does not specifically teach modulating the deposition head to dispense differing volumes to thereby produce the differing sized features.

However, the waveform modulation to dispense differing volumes and produce spots of differing sizes was well known and routinely practiced in the art at the time the claimed invention was made as taught by Hirota et al (Column 12).

Both Blanchard and Hirota use waveform modulation of inkjet dispense heads to dispense reagents onto the support. Hence, it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to apply the waveform modulation of Hirota to the deposition of Blanchard to thereby produce spots of differing sizes desired by Blanchard (Column 9, liens 44-45). One of ordinary skill in the art would have been motivated to do so with a reasonable expectation of success based on the well known technique of waveform modulation as taught by Hirota (Column 12).

Alternatively It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the deposition of Hirota by using the phosphoramidite solution and in situ synthesis of Blanchard.

Hirota et al disclose a method for fabricating an array of biopolymers with different feature sizes (Fig. 14), the method comprising modulating a waveform to at least one orifice ejector (discharge port, #54, Fig. 6) to dispense volumes of fluid from the orifice wherein the volume is based on modulated waveform (Column 11, lines 62-Column 12, line 45, Fig. 9).

Hirota et al teach the method wherein the fabrication is via fluid drop deposition (Column 12, lines 13-45) wherein the fluid deposition uses at least one head and comprises modulating an activation signal for each ejector (Column 12, lines 13-45) and wherein the deposition is completely controlled to produce drops of desired and differing size (Column 12, lines 26-45) wherein the array is fabricated by desired arrangements (Abstract, Column 4), which clearly suggests a planned layout is provided prior to fabrication and using a processor for complete control, but the reference is silent regarding use of a layout and processor.

However, array layout and programmed deposition for array fabrication was well known and routinely practiced in the art at the time the claimed invention was made as taught by Blanchard (§ 5.5.2). Blanchard teaches software and hardware used to provide waveform signals for fabricating the array thereby providing a fully automated and efficient system for array fabrication (Column 3, lines 50-55 and Column 4, lines 19-50). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to apply the programmed synthesis of Blanchard to the array construction of Hirota et al. One of ordinary skill in the art would have been motivated to do so with a reasonable expectation of success and for the added benefit of providing a fully automated and efficient system for array fabrication as taught by Blanchard (Column 3, lines 50-55 and Column 4, lines 19-50).

Hirota et al teach the method produces a nucleic acid array (Column 6, lines 36-40) but the reference does not teach in situ synthesis using phosphoramidite fluid.

However, in situ synthesis was well known and routinely practiced at the time the claimed invention was made as taught by Blanchard.

Blanchard teaches the method deposits droplets of phosphoramidites (Column 13, line 40-Column 14, lines 67) wherein the dispenser provides the defined reagents accurately for simple and direct synthesis (Column 10, lines 28-45). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to apply the in situ synthesis of Blanchard to the device and method of Hirota et al. One of ordinary skill in the art would have been motivated to do so for the expected benefit of simple and direct synthesis of probe spots having differing sizes as desired by Hirota et al.

Regarding Claim 2, Blanchard teaches the method wherein the spots have different size (Column 9, lines 44-45). And Hirota et al teach the method wherein at least two features have different size (Fig. 14).

Regarding Claim 3, Blanchard teaches the method wherein the features are of the same composition e.g. nucleotides making up the oligonucleotide probes (Columns 13-14). And Hirota et al teach the method wherein the two features of different size have the same probe composition (Fig. 14B).

Regarding Claim 4, Blanchard teaches the method wherein the features are of different composition e.g. differing arrangement of nucleotides making up the oligonucleotide probes (Columns 13-14). And Hirota et al teach the method wherein the two features of different size have differing probe composition (Fig. 14A).

Regarding Claim 8, Blanchard teaches the method wherein the ejector is a piezoelectric pump (Column 5, lines 1-2). And Hirota et al teach the method wherein the ejector is a piezoelectric ejector (Column 11, lines 20-24).

Regarding Claim 9, Blanchard teaches the method produces a nucleic acid array (Column 6, lines 6-30). And Hirota et al disclose the method fabricates a nucleic acid array (Column 6, lines 30-45).

Regarding Claim 10, Blanchard teaches the method produces a peptide array (Column 6, lines 6-30).

Regarding Claim 12, Blanchard teaches the method produces spots of differing size (Column 9, lines 44-45). And Hirota et al teach that multiple spots of different sizes are produced via deposition of different volumes, which is controlled by voltage waveform (Column 11, lines 13-35).

Regarding Claim 13, Hirota et al disclose the method wherein the sample reservoirs are aligned above the discharge ports, each to discharge differing fluids (Column 10, lines 10-20) and further exemplify spots of different size having the same composition (Column 15, lines 24-35, Fig. 14B). Hence, the reference anticipates deposition of spots having different size from the same orifice.

Regarding Claim 14, Hirota et al disclose the method wherein the sample reservoirs are aligned above the discharge ports, each to discharge differing fluids (Column 10, lines 10-20) and further exemplify spots of the same size having the same composition (Column 15, lines 8-23, Fig. 14A). Hence, the reference anticipates deposition of spots having different size from a different orifice.

Regarding Claim 15, Blanchard teaches the method produces spots of differing size (Column 9, lines 44-45). Hirota et al disclose the method wherein the dispensers deposit spots of different volume based on waveform applied to each dispenser (Column 12, lines 13-35).

Regarding Claim 16, Hirota et al disclose the method wherein differing waveforms are applied to a dispenser for dispensing different volumes from the same dispenser (Column 12, lines 13-45).

Regarding Claim 17, Hirota et al disclose the method wherein differing waveforms are applied to each dispenser for dispensing different volumes from the different dispensers (Column 12, lines 13-45).

Regarding Claim 18, Blanchard teaches the method wherein deposition is controlled by waveform activation of the ejector (Column 33, lines 58-67). And Hirota et al disclose the method wherein the modulating step includes an activation signal (Column 12, lines 13-17).

Regarding Claim 19, Blanchard teaches the method wherein the activation is controlled by software and program database (§ 5.5.2).

Hirota et al disclose a method of Claim 11 for fabricating an array of biopolymers with different feature sizes (Fig. 14), the method comprising modulating a waveform to at least one orifice ejector (discharge port, #54, Fig. 6) to dispense volumes of fluid from the orifice wherein the volume is based on modulated waveform (Column 11, lines 62-Column 12, line 45, Fig. 9) and further teach the method wherein the modulating step includes an activation signal (Column 12, lines 13-17) wherein the deposition is

completely controlled to produce drops of desired and differing size (Column 12, lines 26-45), which clearly suggests using a database/processor for complete control, but the reference is silent regarding use of a database.

However, programmed deposition for array fabrication was well known and routinely practiced in the art at the time the claimed invention was made as taught by Blanchard (§ 5.5.2). Blanchard teaches software and hardware used to provide waveform signals for fabricating the array thereby providing a fully automated and efficient system for array fabrication (Column 3, lines 50-55 and Column 4, lines 19-50). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to apply the programmed synthesis of Blanchard to the array construction of Hirota et al. One of ordinary skill in the art would have been motivated to do so with a reasonable expectation of success and for the added benefit of providing a fully automated and efficient system for array fabrication as taught by Blanchard (Column 3, lines 50-55 and Column 4, lines 19-50).

Regarding Claim 21, Blanchard teaches the method deposits droplets of phosphoramidites and activator (Column 13, line 40-Column 14, lines 67) wherein the dispenser provides the defined reagents accurately for simple and direct synthesis (Column 10, lines 28-45).

Regarding Claim 22, Blanchard teaches the method produces a nucleic acid array (Column 6, lines 6-30). And Hirota et al disclose the method fabricates a nucleic acid array (Column 6, lines 30-45).

Regarding Claim 23, Blanchard teaches the method produces a peptide array (Column 6, lines 6-30).

Response to Arguments

6. Applicant asserts that Hirota in combination with Blanchard fails to teach all elements of the claimed invention. Applicant asserts that Hirota only teaches producing a DNA microarray by affixing DNA fragments and therefore does not in situ array fabrication as claimed. The assertion is noted but is not found persuasive. First, Applicant has not pointed to a missing element from the combination of Hirota and Blanchard. Hence, the assertion that the combination fails to teach all elements is not found persuasive. Second, the claims are not limited to in situ synthesis as asserted. Therefore, the arguments are not commensurate in scope with the claims.

As discussed above, the combination of Blanchard and Hirota teach all elements of the invention as claimed. Both Blanchard and Hirota use piezo pumps to deposit droplets onto a support and both Blanchard and Hirota are interested in producing spots of different size. Hirota provides the element missing from Blanchard i.e. waveform modulation to produce different volumes and different spot sizes. And Blanchard provides the elements missing from Hirota i.e. array layout, computer controlled deposition and phosphoramidite.

Hence, the combination of Blanchard and Hirota teaches all the elements of the claimed invention. It is maintained that the combination of Blanchard and Hirota make obvious the instantly claimed invention.

Conclusion

7. No claim is allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BJ Forman whose telephone number is (571) 272-0741. The examiner can normally be reached on 6:00 TO 3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ram Shukla can be reached on (571) 272-0735. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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